BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION REQUESTING: (1) ISSUANCE OF A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY AUTHORIZING CONSTRUCTION AND OPERATION OF THE ROADRUNNER TO PHANTOM TO CHINA DRAW 345-KV TRANSMISSION LINE AND ASSOCIATED FACILITIES; (2) APPROVAL OF THE LOCATION OF THE 345-KV TRANSMISSION LINE AND ASSOCIATED FACILITIES; (3) DETERMINATION OF RIGHT-OF-WAY WIDTH FOR THE TRANSMISSION LINE; AND (4) AUTHORIZATION TO ACCRUE AN ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION FOR THE TRANSMISSION LINE AND ASSOCIATED FACILITIES, **SOUTHWESTERN PUBLIC SERVICE COMPANY,** **APPLICANT.**	)	**CASE NO. 20-00085-UT**

DIRECT TESTIMONY

of

NEBIYOU Y. BOGALE

on behalf of

SOUTHWESTERN PUBLIC SERVICE COMPANY

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GLOSSARY OF ACRONYMS AND DEFINED TERMS

Acronym/Defined Term	**Meaning**
ACSS	Aluminum Conductor Steel Supported
Commission	New Mexico Public Regulation Commission
kcmil	1000 circular mils
kV	Kilovolt(s)
MVA	Megavolt amperes
NESC	National Electric Safety Code
Proposed Project	345-kV transmission line and associated facilities extending from SPS's Roadrunner Substation to its Phantom Substation and then to its China Draw Substation located in Eddy and Lea Counties, New Mexico
PUA	Public Utility Act (NMSA 1978, § 62-3-1, *et al.*)
ROW	Right-of-Way
SPS	Southwestern Public Service Company, a New Mexico corporation
XES	Xcel Energy Services Inc.

LIST OF ATTACHMENTS

Case No. 20-____-UT
Direct Testimony
of
Nebiyou Y. Bogale

I. WITNESS IDENTIFICATION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Nebiyou Y. Bogale, and my business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. On whose behalf are you testifying?

A. I am filing testimony on behalf of Southwestern Public Service Company, a New Mexico corporation ("SPS") and wholly-owned subsidiary of Xcel Energy Inc.

Q. By whom are you employed and in what position?

A. I am employed by Xcel Energy Services Inc. ("XES") as a Principal Transmission Engineer.

Q. Please briefly outline your responsibilities as a Principal Transmission Engineer.

A. I am one of the lead engineers designing high voltage and extra high voltage electric power transmission lines, transmission line structures, lattice towers, steel poles, wood poles, and their foundations. I also serve on technical committees, supervise junior engineers, and participate in peer review activities.

Q. Describe your educational background.

A. I received a Bachelor of Science degree in Civil Engineering from Mekelle University in 2001 and a Master's degree in Power Engineering from Norwegian University of Science and Technology in Trondheim, Norway in 2008.

Q. Please describe your professional experience.

A. I have been employed as an electric power transmission engineer since 2001. I began my career as a construction site supervisor with EEP Co., where my responsibilities included ensuring construction was performed in accordance with design specifications for transmission and substation projects. In 2004, I began to work as a design engineer in the power system design division. I designed multiple 33 kilovolt ("kV"), 66-kV, 132-kV, 230-kV and 400-kV lines and electromechanical support structures in substations. I have also worked in electromechanical project administration, where I was involved in project administration, contract specification preparation, tender evaluations and commissioning works. I joined XES in 2009, where I have been employed as a Senior Engineer and now as Principal Engineer. During the last ten years, I have designed multiple high voltage and extra high voltage transmission lines in various states. I have also been involved in maintenance and rebuild projects. As a lead engineer, I have designed transmission lines, transmission line support structures, and foundations. I am also involved in project cost estimating, various technical committees and as project engineer.

Q. Do you hold any professional licenses?

A. Yes, I am a registered Professional Engineer in New Mexico, Texas, Minnesota, Wisconsin, South Dakota, Michigan, and Colorado.

II. ASSIGNMENT

Q. What is the purpose of your testimony?

A. In accordance with Section 62-9-3.2 of the New Mexico Public Utility Act ("PUA") (NMSA 1978, § 62-3-1, *et seq*.), my testimony supports SPS's request for a New Mexico Public Regulation Commission ("Commission") determination that a 150-foot right-of-way ("ROW") width is necessary to construct, operate, and maintain the proposed 345-kV transmission line that will extend from SPS's Roadrunner Substation to its Phantom Substation, and then to its China Draw Substation ("Proposed Project"). The Proposed Project will connect SPS's existing Roadrunner Substation, located approximately 22.6 miles northwest of Jal, New Mexico, to the existing China Draw Substation, which is approximately 14.2 miles southwest of Malaga, New Mexico, with connections at the Phantom Substation. This Project is located in Eddy and Lea Counties, New Mexico. I will also support SPS's request for approval of a 200-foot ROW width at the location where the transmission line crosses the Pecos River.

Specifically, my testimony will: (1) discuss the statutory requirements for approval of ROW widths in excess of 100-feet and explain the need for a ROW width of 150-feet for the Proposed Project; (2) support SPS's request for a 200-foot wide ROW at the Pecos River crossing; (3) describe the circuit design and construction of the Proposed Project; and (4) discuss the estimated costs of the transmission line associated with the Proposed Project.

Q. Were Attachments NYB-1 through NYB-3 prepared by you or under your supervision?

A. Yes.

III. DETERMINATION OF ROW WIDTH

Q. What are the statutory requirements regarding ROW widths in relation to the proposed 345-kV transmission line?

A. Section 62-9-3.2(A) of the PUA requires utilities to obtain a Commission determination that a proposed ROW width greater than 100-feet is necessary before constructing a transmission line and associated facilities. Utilities are required to file an application that sets forth the facts necessary to allow the Commission to determine that the requested ROW width is necessary (*see* NMSA 1978, § 62-9-3.2(C)). Applicants are also required to provide notice of the time and place of the hearing on the application to all landowners and occupants of the property impacted by the requested ROW (*see* NMSA 1978, § 62-9-3.2(D)).[1]

Q. Has SPS determined the ROW width required for the proposed 345-kV transmission line?

A. Yes. The Proposed Project will generally require a 150-foot ROW width that allows for 75 feet on either side of the center line. The 150-foot width is calculated based on the assumption that a typical span width will be 1,100 feet or

[1] Please refer to the Direct Testimony of Nisha P. Fleischman.

less. SPS requests approval of a 200-foot ROW width at the Pecos River crossing due to the length of the span at that location, which is depicted in Section B of Attachment NYB-1 to my direct testimony.

Q. Please explain why a 150-foot ROW width is generally required for the Proposed Project.

A. The 150-foot wide ROW is required to comply with the requirements of Rules 234 A-2, B-1, and G of the National Electric Safety Code ("NESC"). Specifically, the NESC specifies minimum horizontal and vertical clearance requirements for overhead lines, which vary depending on the size of the transmission line. For the Proposed Project, the ROW width must be sufficient for the transmission line, which incorporates a basic phase spacing of 30 feet for 345-kV design. The 150-foot wide ROW will be sufficient to contain and provide applicable safety clearances for the horizontal displacement of the 795 kcmil (1000 circular mils) ACSS ("Aluminum Conductor Steel Supported") bundled conductors on a 1,100-foot span. In accordance with the NESC, the wind pressure loading on the bundled conductors is six pounds per square inch.[2]

[2] *See* NESC Section 234A2 for loading requirement.

The proposed 150-foot wide ROW also allows for flexibility during design and construction by allowing spans to be longer than 1,000 feet and phase spacing wider than 30 feet as necessary without violating NESC requirements. Further, it is customary in the utility industry to have a ROW width that is slightly larger than the calculated minimum under the NESC to account for construction tolerances and to provide for the general safety of the public. Finally, a 150-foot wide ROW will be necessary to provide adequate access for maintenance of the transmission line.

In addition to the NESC requirements, SPS also designs transmission lines to maintain a reduced clearance at the edge of the ROW under extreme wind conditions (for this project the extreme wind condition is 90 miles per hour).[3] The 150-foot wide ROW width allows this clearance to be maintained.

Q. Did you prepare an analysis supporting SPS's request for a 150-foot ROW width?

A. Yes. Attachment NYB-1 provides the calculations and output reports from SPS's transmission line design software for determining the minimum ROW width

[3] Extreme wind conditions are defined under NESC Section 250C.

needed for the proposed transmission line. SPS has calculated the minimum ROW width needed for transmission lines with spans ranging from 900-feet to 1,100-feet. The calculations are based on NESC wind loading requirements and structure characteristics, and account for extreme wind conditions.

Q. You mentioned above that SPS is requesting approval of a 200-foot ROW width at the Pecos River Crossing. Please explain why a 200-foot ROW width is necessary at that location.

A. SPS is requesting approval of a 200-foot ROW width at the Pecos River crossing because the length of the span that will be necessary to traverse the river is approximately 1,720 feet, which necessitates a wider ROW width.

Q. Did you prepare an analysis supporting SPS's request for a 200-foot ROW width at the Pecos River crossing?

A. Yes. This information is included in Section B of Attachment NYB-1.

Q. Could there be additional areas where a ROW width greater than 150 feet is necessary?

A. Yes. A wider ROW width may be necessary in limited areas, but the locations and widths cannot be determined until an approved route is surveyed.

Q. Can you provide an example of an area where a ROW of greater than 150 feet may be necessary?

A. One example of when a ROW of more than 150 feet would be required is if SPS needs to increase the span length to avoid sensitive resources or pipelines. Spans between structures usually range from 800 to 1,000 feet. If the span length is greater than this range, then the ROW may need to exceed 150 feet to account for the blowout of the conductor and insulator string.

Q. Will SPS notify the Commission if it determines that a ROW width greater than 150 feet is necessary at any location other than the Pecos River Crossing?

A. Yes. SPS agrees to file a notice in the record in this proceeding if it determines that a span greater than 1,100 feet, which will require a ROW width greater than 150 feet, is necessary at any location other than the Pecos River Crossing.

IV. CIRCUIT DESIGN AND CONSTRUCTION FOR THE PROPOSED TRANSMISSION LINE

Q. Please briefly describe the interconnection facilities for the Proposed Project.

A. The Proposed Project includes the expansion of the facilities at SPS's Roadrunner, Phantom, and China Draw Substations. At the Roadrunner Substation, the yard would be enlarged to add a new 345-kV three-terminal ring bus with termination points for the 445.9 megavolt amperes ("MVA"), 345/115-kV autotransformer, one 345-kV transmission line to the Kiowa Substation, and the proposed 345-kV transmission line to the Phantom Substation.[4]

At the Phantom Substation, SPS would install a new 345-kV four-terminal ring bus with termination points for the proposed 345-kV transmission line to the Roadrunner Substation, the proposed 345-kV transmission line to the China Draw Substation, and two new 445.9 MVA, 345/115-kV autotransformers.

At the China Draw Substation, the yard would be enlarged to add a new 345-kV three-terminal ring bus with termination points for the 448 MVA,

[4] *See* Rule 592.10.A(4).

345/115-kV autotransformer, the 345-kV transmission line to the North Loving Substation, and the proposed 345-kV transmission line to the Phantom Substation.[5]

Q. Please briefly describe the design of the circuit for the Proposed Project.

A. The Proposed Project will utilize self-supporting steel structures installed on concrete foundations at corners and terminations of the transmission line. The remaining tangent (in-line) structures will typically be direct buried H-frame steel structures. If there are locations that require a narrower footprint to avoid existing oil wells and terrain restrictions, single-pole steel structures on concrete foundations will be installed.

Typical structure configuration drawings are shown in Attachment NYB-2. The conductors will typically be 30 feet apart on both single-pole structures and H-frame structures. The conductors will be bundled 795 kcmil ACSS for the 345-kV transmission line. The new shield wires will be a combination of 3/8 inch extra high strength steel and optical ground wire. One of the two (2) shield wires will be 3/8 inch extra high strength steel. The other will

[5] *See* Rule 592.10.A(4).

be an optical ground wire with fiber optic strands internally in tubes, placed in the stranded cable replacing some of the solid strands. The fiber optic strands are used for communication between relays and other substation equipment and transmit operational information to SPS control centers.

Q. Please describe the tangent (in-line) structures and identify how many will be installed.

A. The single-circuit H-Frame tangent structures will utilize steel arms to support the transmission line conductors. The H-Frame structure consists of two poles, X-braces, cross arm and two static peaks (support arms for shield wires). The typical tangent structure configuration is shown on drawing SD-T0-615 in Attachment NYB-2. These structures will typically be spaced approximately 850 to 1,100 feet apart and will be fabricated of self-weathering steel. The total line length of the Proposed Project will be approximately 40 miles, and approximately 233 H-frame type steel pole structures will be installed.

Q. Please describe the corner and termination structures and identify how many will be installed.

A. The most common structures used at corners and terminations of the Proposed Project will be self-supporting self-weathering steel 3-pole structures installed on concrete foundations as shown in Attachment NYB-2. Approximately 30 of these structures will be used along the route. Vertical, self-supporting self-weathering single-pole steel structures may be utilized in congested areas where reduced horizontal space is available and along the line for phasing purposes. Typical corner, angle and transposition structure configurations are shown on drawings in Attachment NYB-2.

Q. What is the construction timetable for the Proposed Project?

A. Preliminary transmission line design began in September 2019 and is ongoing. Material requests will be submitted following approval of SPS's application in this case. All material should be available approximately 9 to 12 months after the material requests are initiated. Construction should take approximately 11 to 12 months to complete. The expected in-service date of the Proposed Project is November 2021.

V. ESTIMATED COSTS ASSOCIATED WITH PROPOSED TRANSMISSION LINE

Q. What is the total cost of the proposed transmission line?

A. The total cost of the proposed transmission line is approximately $53.7 million.[6] Please refer to Attachment NYB-3 for a breakdown of the estimated costs by component.

Q. How did you quantify the total cost of the proposed transmission line?

A. The four major components that comprise the transmission line's estimated cost are: (1) labor; (2) equipment; (3) material; and (4) other.

Q. Explain the labor component of the estimated costs.

A. The labor costs are determined by the length of the transmission line, as well as the number and types of structures required to construct the line. The length of the transmission line dictates the amount of labor required to install conductor and overhead shield wire.[7] The length also affects the required number of structures

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[6] Please refer to the Direct Testimony of Jarred J. Cooley for a discussion of the total costs of the Proposed Project and the projected allocation of the total cost of the Proposed Project based on Southwest Power Pool's Highway/Byway cost allocation methodology, along with an illustrative example of the projected allocation of the total costs to be borne by SPS and SPS's New Mexico retail customers.

[7] Shield wire is connected directly to the top of a transmission structure to protect conductors from a direct lightning strike, minimizing the possibility of power outages.

that need to be installed to support the circuit from the beginning to the end of the transmission line's route.

The type of structure also dictates the amount of labor required to install each structure and its associated foundation, if applicable, and hardware. SPS uses design software to determine the number and type of structures required to complete the transmission line. Once the number and types of structures are identified, the labor costs (such as labor rates and overhead rates) are estimated based on actual labor costs experienced by SPS on prior transmission projects.

Q. Please further explain the equipment component of the estimated costs.

A. Most of the equipment used for transmission projects is owned or rented by contractors. Thus, the costs of the equipment are determined by the contractors and will be included in the contractors' bids. Because SPS does not receive contractor bids until after the design has been completed and a construction package has been issued, the estimated costs for equipment are based on bid units received for SPS's past transmission projects and included in the contract labor costs estimated above.

Q. Please further explain the materials component of the estimated costs.

A. The major materials required to construct the transmission line include steel structures, foundation material, insulators, pole hardware, conductor, and overhead shield wires. As I discussed earlier, SPS uses design software to determine the number and types of the structures required to complete the transmission line. SPS also uses this design software to estimate the weight and cost of each structure type. The remainder of the major materials for the structures is estimated using past transmission projects' material costs.

Q. What types of costs fall under the "other" category of costs?

A. The types of costs that fall into this category are for overhead, contingency and escalation. The rates used for all three of these types of costs are provided by SPS. Overhead includes all costs except for direct labor, direct materials, and direct expenses. Contingency accounts are for unexpected cost items that may arise during the project. Escalation accounts for possible increases in estimated costs due to inflation or other factors.

Q. Does another witness address the total cost of the Proposed Project and associated Allowance for Funds Used During Construction?

A. Yes. Mr. Cooley addresses those topics in his direct testimony.

Q. Does this conclude your pre-filed direct testimony?

A. Yes.

VERIFICATION

On this day, April 8, 2020, I, Nebiyou Y. Bogale, swear and affirm under penalty of perjury under the law of the State of New Mexico, that my testimony contained in Direct Testimony of Nebiyou Y. Bogale is true and correct.

/s/ Nebiyou Y. Bogale
NEBIYOU Y. BOGALE

NYB-1. Right of Way (ROW) Width Analysis for China Draw-Phantom-Road Runner 345kv Transmission line Construction Project

A. Right way width analysis for a typical span

The following assumptions and design parameters are used for this analysis.

- Conductor 795kcmil 26/7 ACSS Conductor
- Static Wire 1 - 3/8"-7 strand Extra High Strength steel(EHS)
- Static Wire 2 -48 fiber OPGW wire
- Typical Span length Range's between 800ft to 1100ft
- Typical structure used for analysis is an H-frame type with 140ft height above ground.
- Assumed pole top deflection not to exceed[1] 2% of structure height above the ground.
- No wind, no Ice, 60°F Final weather case - NESC 234 A.1 6
- NESC Blowout 6PSF weather case - 6 psf wind, no ice, 60°F Final - NESC 234 A.2 6
- NESC Extreme Wind weather case - 20.7psf (90 mph) wind, no ice, 60°F Final
- Voltage Adder (Rule 233B1a and Rule 234G1) = (Φ - Φ voltage /√3 - 22) * 0.4/12. Voltage based on range maximum defined in ANSI C84.1
- Elevation Adder of 3% of voltage adder for each 1000ft in excess of 3300 ft above mean sea level
- Additional clearances are required by Rule 234 for buildings accessible to pedestrians or truck traffic
- Accessible refers to the ability to be casually accessed through a doorway or permanently mounted ladder who neither exerts extraordinary physical effort nor employs tools or devices to gain entry.
- The basic clearance for streetlights, etc. is to 50kV instead of 22kV
- Values correspond to the horizontal clearances to buildings found in Table 3 of XEL-STD-TRANSMISSION LINE CLEARANCE CRITERIA V 3.1
- Values correspond to flashover = 10kV (Φ - gnd) per in. and includes range maximum defined in ANSI C84.1.

[1] 4% pole top deflection is assumed for 1700ft Pecos river crossing analysis.

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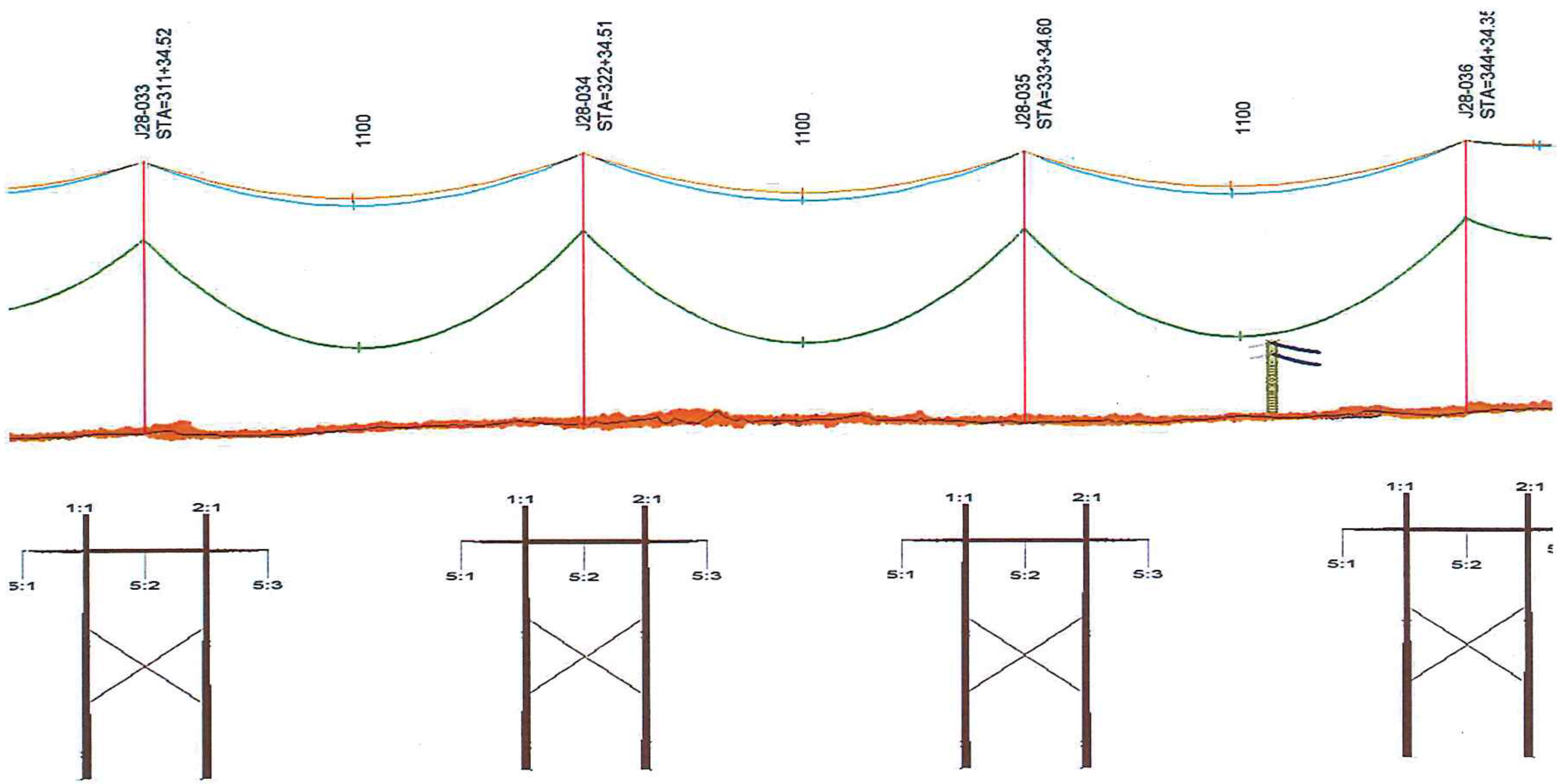

A typical profile view of an 1100ft span length as modeled for computer analysis

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PLSCADD Computer analysis output (please note that the maximum values are shown in red texts

Ruling Span(ft)	Structure Height (ft)	Structure Deflection at 2%(ft)	Ahead Span Cable File Name	Voltage (kV)	Weather Case Description	Cable Condition	Wind From	Max Blowout Offset (ft)
1100.00	140.00	2.80	3-8_7-strand_ehs_steel_xcel.wir	0.00	60° F	Max Sag FE	NA	-15.98
1100.00	140.00	2.80	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	-15.75
1100.00	140.00	2.80	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-29.71
1100.00	140.00	2.80	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Left	-15.62
1100.00	140.00	2.80	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Right	-42.63
1100.00	140.00	2.80	afl-cc-48f-ogw076.wir	0.00	60° F	Max Sag FE	NA	15.98
1100.00	140.00	2.80	afl-cc-48f-ogw076.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	31.34
1100.00	140.00	2.80	afl-cc-48f-ogw076.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	15.72
1100.00	140.00	2.80	afl-cc-48f-ogw076.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Left	43.90
1100.00	140.00	2.80	afl-cc-48f-ogw076.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Right	15.61
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	60° F	Max Sag FE	NA	-30.79
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	60° F	Max Sag FE	NA	-1.50
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	60° F	Max Sag FE	NA	30.79
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	-25.11
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	18.86
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	51.15
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-51.15
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-21.86
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	25.11
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	-20.20
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	37.78
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	70.06
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	-70.08
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	-40.77
1100.00	140.00	2.80	drake_acss_xcel - 7400at 1000ft.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	20.21

02/11/2020

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Criteria Notes:
XCEL ENERGY PLS-CADD Criteria File (.cri) Version 1

****Version History****

06/28/2018 Version 0 - Initial version for general review
07/27/2018 Version 1 - First release version (updated insulator swing criteria)

****This criteria file is based on XCEL ENERGY Design Criteria as outlined in the following documents****

**** XEL-STD-TRANSMISSION LINE STRUCTURAL LOADING CRITERIA, Version 1.2
**** XEL-STD-TRANSMISSION LINE CLEARANCE CRITERIA, Version 2.2
**** XEL-STD-DESIGN GUIDE FOR TRANSMISSION LINE CONDUCTOR, Version 1.0
**** XEL-STD-CRITERIA FOR END & DESIGN FOR FOUNDATION DEFLECTION AND ROTATION DESIGN, Version 2.0
**** XEL-STD-DESIGN GUIDE FOR TRANSMISSION LINE INSULATORS, Version 2.0
**** XEL-POL-FACILITY RATING METHODOLOGY, Version 10.1

Blowout Report

Start Struct Number	Start Struct Set	Start Struct Phase	End Struct Number	End Struct Set	End Struct Phase	Ahead Span Cable File Name	Voltage (kV)	Weather Case Description	Cable Condition	Wind From	Max Blowout Station (ft)	Max Blowout Offset (ft)	Leftmost Blowout Station (ft)	Leftmost Blowout Offset (ft)	Rightmost Blowout Station (ft)	Rightmost Blowout Offset (ft)	Notes
J27-058	1	1	J27-059	1	1	3-8_7-strand_ehs_steel_xcel.wir	0	60° F	Max Sag FE	NA	55204.51	-15.98	55204.51	-15.98	54104.08	-15.94	
J27-058	1	1	J27-059	1	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	55204.49	-15.75	55204.49	-15.75	54663.42	-2.21	
J27-058	1	1	J27-059	1	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	54663.41	-29.71	54663.41	-29.71	54104.07	-16.14	
J27-058	1	1	J27-059	1	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC 250C (90 MPH)	Max Sag FE	Left	55204.44	-15.62	55204.44	-15.62	54644.77	10.71	
J27-058	1	1	J27-059	1	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC 250C (90 MPH)	Max Sag FE	Right	54663.45	-42.63	54663.45	-42.63	54104.07	-16.28	
J27-058	2	1	J27-059	2	1	afl-cc-48f-ogw076.wir	0	60° F	Max Sag FE	NA	55204.51	15.98	54104.08	15.94	55204.51	15.98	
J27-058	2	1	J27-059	2	1	afl-cc-48f-ogw076.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	54663.40	31.34	54104.07	16.16	54663.40	31.34	
J27-058	2	1	J27-059	2	1	afl-cc-48f-ogw076.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	55204.49	15.72	54663.40	0.58	55204.49	15.72	
J27-058	2	1	J27-059	2	1	afl-cc-48f-ogw076.wir	0	NESC 250C (90 MPH)	Max Sag FE	Left	54663.44	43.90	54104.07	16.29	54663.44	43.90	
J27-058	2	1	J27-059	2	1	afl-cc-48f-ogw076.wir	0	NESC 250C (90 MPH)	Max Sag FE	Right	55204.43	15.61	54644.76	-11.98	55204.43	15.61	
J27-058	5	1	J27-059	5	1	drake_acss_xcel - 7400at 1000ft.wir	345	60° F	Max Sag FE	NA	55204.42	-30.79	55204.42	-30.79	54104.06	-30.79	
J27-058	5	2	J27-059	5	2	drake_acss_xcel - 7400at 1000ft.wir	345	60° F	Max Sag FE	NA	54104.07	-1.50	54104.07	-1.50	55204.42	-1.50	
J27-058	5	3	J27-059	5	3	drake_acss_xcel - 7400at 1000ft.wir	345	60° F	Max Sag FE	NA	55204.43	30.79	54104.07	30.79	55204.43	30.79	
J27-058	5	1	J27-059	5	1	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	54104.06	-25.11	54104.06	-25.11	54663.28	-10.43	
J27-058	5	2	J27-059	5	2	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	54663.28	18.86	54104.06	4.18	54663.28	18.86	
J27-058	5	3	J27-059	5	3	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	54663.29	51.15	54104.07	36.48	54663.29	51.15	
J27-058	5	1	J27-059	5	1	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	54663.29	-51.15	54663.29	-51.15	54104.06	-36.48	
J27-058	5	2	J27-059	5	2	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	54663.29	-21.86	54663.29	-21.86	54104.06	-7.18	
J27-058	5	3	J27-059	5	3	drake_acss_xcel - 7400at 1000ft.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	54104.06	25.11	54663.29	10.43	54104.06	25.11	
J27-058	5	1	J27-059	5	1	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	54104.05	-20.20	54104.05	-20.20	54663.32	8.51	
J27-058	5	2	J27-059	5	2	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	54663.32	37.78	54104.06	9.09	54663.32	37.78	
J27-058	5	3	J27-059	5	3	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	54663.33	70.06	54104.07	41.38	54663.33	70.06	
J27-058	5	1	J27-059	5	1	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	54663.33	-70.08	54663.33	-70.08	54104.06	-41.38	
J27-058	5	2	J27-059	5	2	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	54663.33	-40.77	54663.33	-40.77	54104.06	-12.09	
J27-058	5	3	J27-059	5	3	drake_acss_xcel - 7400at 1000ft.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	54104.06	20.21	54663.32	-8.49	54104.06	20.21	

For 0kV wires between structures J27-058 and J27-058, maximum offset is 43.90 (ft), the leftmost offset is -42.63 (ft), rightmost offset is 43.90 (ft)
For 345kV wires between structures J27-058 and J27-058, maximum offset is -70.08 (ft), the leftmost offset is -70.08 (ft), rightmost offset is 70.06 (ft)

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In order to meet the operational & maintenance practices in accordance with Xcel Energy own guidelines and meet the clearance requirements from energized parts of the transmission line, in accordance with the National Electrical Safety Code (NESC), the following three factors have been considered and the maximum value is chosen as recommended easement width as shown below.

Calculated conductor displacement at NESC no wind no ice Criteria = **30ft**

Calculated conductor displacement at NESC blow out Criteria = **51.26ft**

Calculated conductor displacement at extreme wind weather case = **69.88ft**

Voltage adder at NESC blowout[2] = **14ft**

Voltage adder at extreme wind[3] = **1.8ft**

Voltage adder at no wind no ice[4] = **17ft**

Structure Deflection = **2.8ft**

Required easement width is the maximum these three conditions:

1. NESC no wind no ice + voltage adder+structure deflection+ construction tolerance = 30+17 =**47.0ft**
2. NESC blow out + voltage adder+structure deflection+ construction tolerance = 51.26+14+2.8 = **68.06ft**
3. NESC Ext. wind blow out+ voltage adder+structure deflection+ construction tolerance = 69.88+1.8+2.8 =**74.48ft**

Recommended easement width (half from the center) = **75ft**

Total recommended easement width = **150ft**

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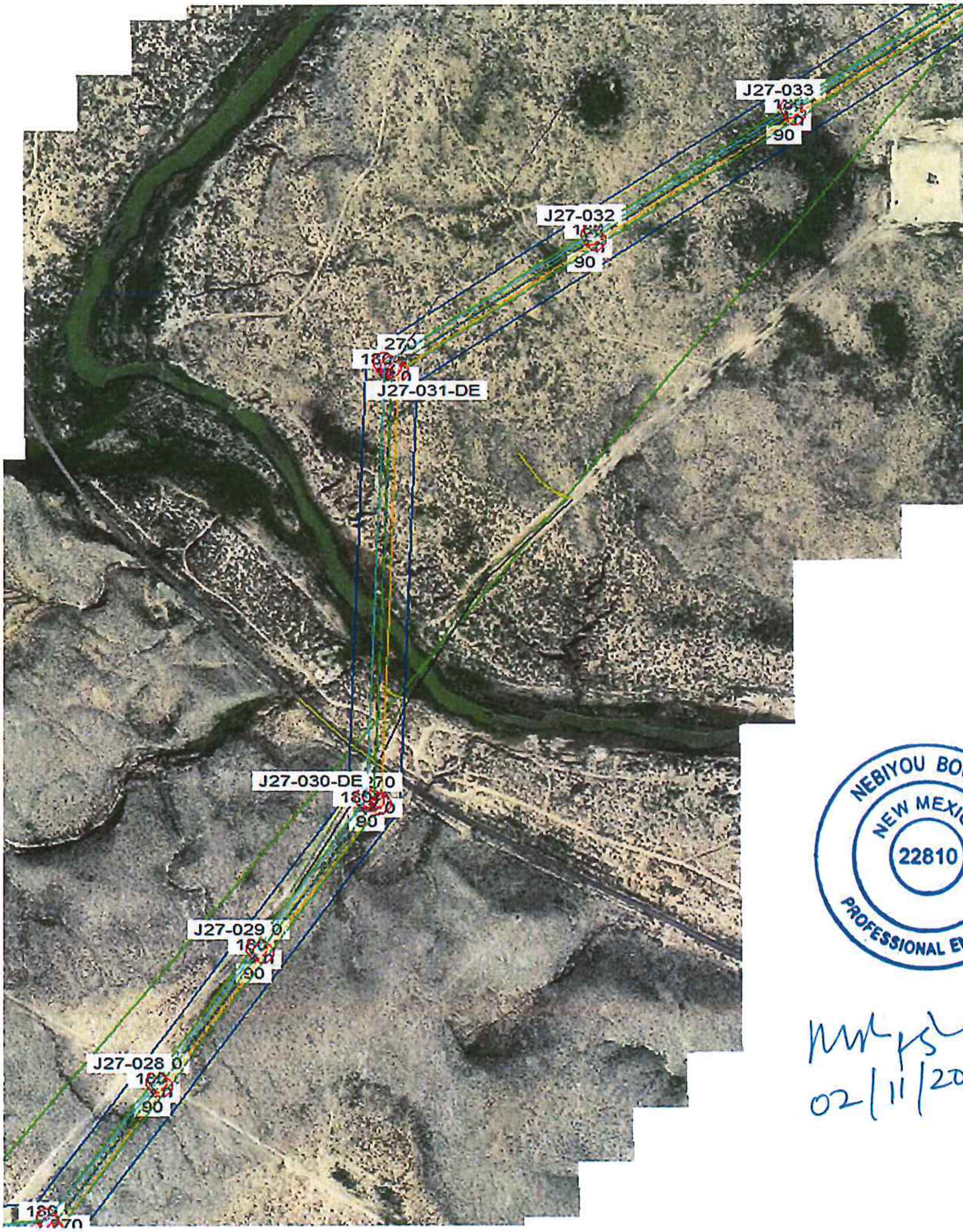
[2] Voltage adder value at NESC blow out weather case shown above also includes 3ft Xcel Energy tolerances.
[3] This voltage adder value at NESC extreme wind weather case is based on RUS Bulletin 1724E-200 7.2.3 for details
[4] Voltage adder value at NESC no wind, no ice, 60 deg. final weather case shown above also includes 3ft Xcel Energy tolerances

B. Pecos River crossing recommended 200ft easement width analysis



Top View Pecos River Crossing

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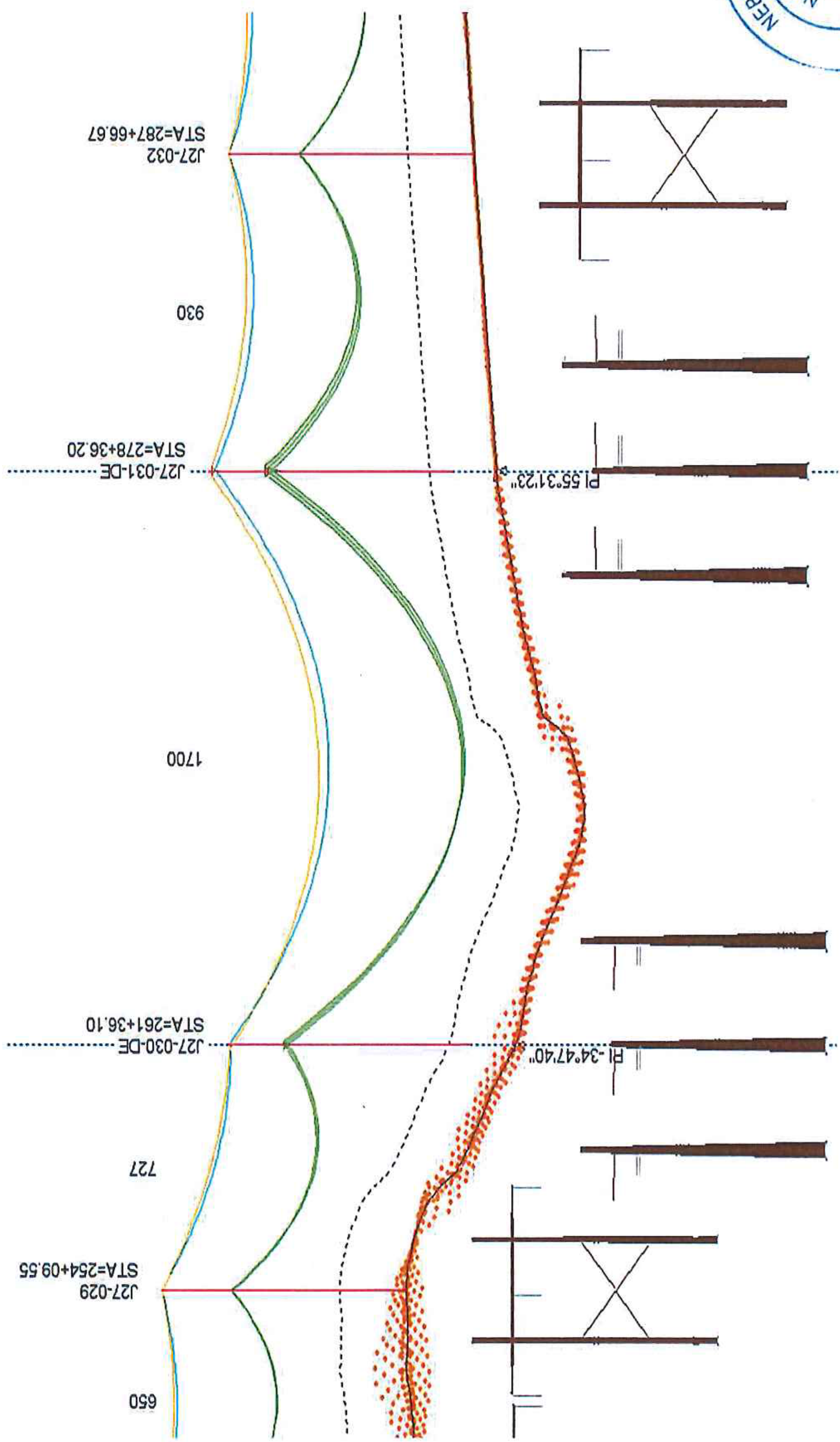

Pecos river crossing profile View as modeled for Computer analysis

PLSCADD Analysis Report (The maximum conductor displacement values are shown in Red

Ruling Span(ft)	Structure Height (ft)	Structure Deflection at 4%(ft)	Ahead Span Cable File Name	Voltage (kV)	Weather Case Description	Cable Condition	Wind From	Max Blowout Offset (ft)
1700.00	160.00	6.40	3-8_7-strand_ehs_steel_xcel.wir	0.00	60° F	Max Sag FE	NA	-29.73
1700.00	160.00	6.40	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	-29.64
1700.00	160.00	6.40	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-57.91
1700.00	160.00	6.40	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Left	-29.56
1700.00	160.00	6.40	3-8_7-strand_ehs_steel_xcel.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Right	-81.81
1700.00	160.00	6.40	afl-cc-48f-ogw076.wir	0.00	60° F	Max Sag FE	NA	29.77
1700.00	160.00	6.40	afl-cc-48f-ogw076.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	61.06
1700.00	160.00	6.40	afl-cc-48f-ogw076.wir	0.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	29.49
1700.00	160.00	6.40	afl-cc-48f-ogw076.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Left	83.46
1700.00	160.00	6.40	afl-cc-48f-ogw076.wir	0.00	NESC 250C (90 MPH)	Max Sag FE	Right	29.30
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	60° F	Max Sag FE	NA	-29.76
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	60° F	Max Sag FE	NA	0.23
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	60° F	Max Sag FE	NA	29.37
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	-28.52
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	31.16
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	59.51
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-59.79
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	-31.09
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	28.14
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	31.21
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	59.42
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Left	87.61
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	-88.18
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	-59.35
1700.00	160.00	6.40	drake_acss_xcel.wir	345.00	NESC 250C (90 MPH)	Max Sag FE	Right	-30.48

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Criteria Notes:
XCEL ENERGY PLS-CADD Criteria File (.cri) Version 1

****Version History****

06/28/2018 Version 0 - Initial version for general review
07/27/2018 Version 1 - First release version (updated insulator swing criteria)

****This criteria file is based on XCEL ENERGY Design Criteria as outlined in the following documents****

**** XEL-STD-TRANSMISSION LINE STRUCTURAL LOADING CRITERIA, Version 1.2
**** XEL-STD-TRANSMISSION LINE CLEARANCE CRITERIA, Version 2.2
**** XEL-STD-DESIGN GUIDE FOR TRANSMISSION LINE CONDUCTOR, Version 1.0
**** XEL-STD-CRITERIA FOR END & DESIGN FOR FOUNDATION DEFLECTION AND ROTATION DESIGN, Version 2.0
**** XEL-STD-DESIGN GUIDE FOR TRANSMISSION LINE INSULATORS, Version 2.0
**** XEL-POL-FACILITY RATING METHODOLOGY, Version 10.1

Blowout Report

Start Struct Number	Start Struct Set	Start Struct Phase	End Struct Number	End Struct Set	End Struct Phase	Ahead Span Cable File Name	Voltage (kV)	Weather Case Description	Cable Condition	Wind From	Max Blowout Station (ft)	Max Blowout Offset (ft)	Leftmost Blowout Station (ft)	Leftmost Blowout Offset (ft)	Rightmost Blowout Station (ft)	Rightmost Blowout Offset (ft)	Notes
J27-030-DE	1	1	J27-031-DE	11	1	3-8_7-strand_ehs_steel_xcel.wir	0	60° F	Max Sag FE	NA	26147.90	-29.73	26147.90	-29.73	27806.01	-27.30	
J27-030-DE	1	1	J27-031-DE	11	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	26147.90	-29.64	26147.90	-29.64	27005.75	0.92	
J27-030-DE	1	1	J27-031-DE	11	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	26977.18	-57.91	26977.18	-57.91	27806.01	-29.34	
J27-030-DE	1	1	J27-031-DE	11	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC 250C (90 MPH)	Max Sag FE	Left	27822.59	-29.56	27822.59	-29.56	27005.63	24.82	
J27-030-DE	1	1	J27-031-DE	11	1	3-8_7-strand_ehs_steel_xcel.wir	0	NESC 250C (90 MPH)	Max Sag FE	Right	26977.11	-81.81	26977.11	-81.81	27822.59	-29.88	
J27-030-DE	2	1	J27-031-DE	12	1	afl-cc-48f-ogw076.wir	0	60° F	Max Sag FE	NA	26136.10	29.77	27803.45	27.67	26136.10	29.77	
J27-030-DE	2	1	J27-031-DE	12	1	afl-cc-48f-ogw076.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	26953.67	61.06	27803.45	27.96	26953.67	61.06	
J27-030-DE	2	1	J27-031-DE	12	1	afl-cc-48f-ogw076.wir	0	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	26136.10	29.49	26982.01	-3.96	26136.10	29.49	
J27-030-DE	2	1	J27-031-DE	12	1	afl-cc-48f-ogw076.wir	0	NESC 250C (90 MPH)	Max Sag FE	Left	26953.58	83.46	27803.46	28.15	26953.58	83.46	
J27-030-DE	2	1	J27-031-DE	12	1	afl-cc-48f-ogw076.wir	0	NESC 250C (90 MPH)	Max Sag FE	Right	26136.10	29.30	26981.90	-26.36	26136.10	29.30	
J27-030-DE	5	1	J27-031-DE	15	1	drake_acss_xcel.wir	345	60° F	Max Sag FE	NA	26162.84	-29.76	26162.84	-29.76	27819.51	-27.21	
J27-030-DE	5	2	J27-031-DE	15	2	drake_acss_xcel.wir	345	60° F	Max Sag FE	NA	27805.33	0.23	26153.37	-0.17	27805.33	0.23	
J27-030-DE	5	3	J27-031-DE	15	3	drake_acss_xcel.wir	345	60° F	Max Sag FE	NA	26144.31	29.37	27790.74	27.75	26144.31	29.37	
J27-030-DE	5	1	J27-031-DE	15	1	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	26162.84	-28.52	26162.84	-28.52	27005.58	2.82	
J27-030-DE	5	2	J27-031-DE	15	2	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	26993.75	31.16	26153.38	1.07	26993.75	31.16	
J27-030-DE	5	3	J27-031-DE	15	3	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Left	26953.90	59.51	27790.73	28.97	26953.90	59.51	
J27-030-DE	5	1	J27-031-DE	15	1	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	26977.48	-59.79	26977.48	-59.79	27819.50	-28.44	
J27-030-DE	5	2	J27-031-DE	15	2	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	26965.65	-31.09	26965.65	-31.09	27805.32	-0.99	
J27-030-DE	5	3	J27-031-DE	15	3	drake_acss_xcel.wir	345	NESC BLOWOUT (60° F - 6 PSF)	Max Sag FE	Right	26144.31	28.14	26981.86	-2.38	26144.31	28.14	
J27-030-DE	5	1	J27-031-DE	15	1	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	27005.44	31.21	26162.83	-27.31	27005.44	31.21	
J27-030-DE	5	2	J27-031-DE	15	2	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	26993.65	59.42	26153.37	2.27	26993.65	59.42	
J27-030-DE	5	3	J27-031-DE	15	3	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Left	26953.82	87.61	27790.73	30.15	26953.82	87.61	
J27-030-DE	5	1	J27-031-DE	15	1	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	26977.42	-88.18	26977.42	-88.18	27819.50	-29.65	
J27-030-DE	5	2	J27-031-DE	15	2	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	26965.56	-59.35	26965.56	-59.35	27805.32	-2.19	
J27-030-DE	5	3	J27-031-DE	15	3	drake_acss_xcel.wir	345	NESC 250C (90 MPH)	Max Sag FE	Right	26981.74	-30.48	26981.74	-30.48	26144.31	26.96	

For 0kV wires between structures J27-030-DE and J27-031-DE, maximum offset is 83.46 (ft), the leftmost offset is -81.81 (ft), rightmost offset is 83.46 (ft)
For 345kV wires between structures J27-030-DE and J27-031-DE, maximum offset is -88.18 (ft), the leftmost offset is -88.18 (ft), rightmost offset is 87.61 (ft)

In order to meet the operational & maintenance practices in accordance with Xcel Energy own guidelines and meet the clearance requirements from energized parts of the transmission line, in accordance with the National Electrical Safety Code (NESC), the following three factors have been considered and the maximum value is chosen as recommended easement width as shown below.

For relevant design assumptions and standards & codes used for this analysis, please refer section A.

Calculated conductor displacement at NESC no wind no ice Criteria = **30ft**

Calculated conductor displacement at NESC blow out Criteria = **59.5ft**

Calculated conductor displacement at extreme wind weather case = **88.18ft**

[5]Voltage adder at NESC blowout =**14ft**

Voltage adder at Extreme wind[6] =**1.8ft**

Voltage adder at no wind no ice[7] = **17ft**

Structure Deflection = **6.4ft**

Recommended easement width is the maximum of,

1. NESC no wind no ice + voltage adder+structure deflection+ construction tolerance = 30+17+6.4 = **47.0 ft**
2. NESC blow out + voltage adder+structure deflection+ construction tolerance 59.5+14+6.4 = **79.9ft**
3. NESC Ext. wind blow out+ voltage adder+structure deflection+ construction tolerance =88.18+1.8+6.4 = **96.38ft**

Recommended easement width (half from the center) = **100ft**

Total recommended easement width = **200ft**

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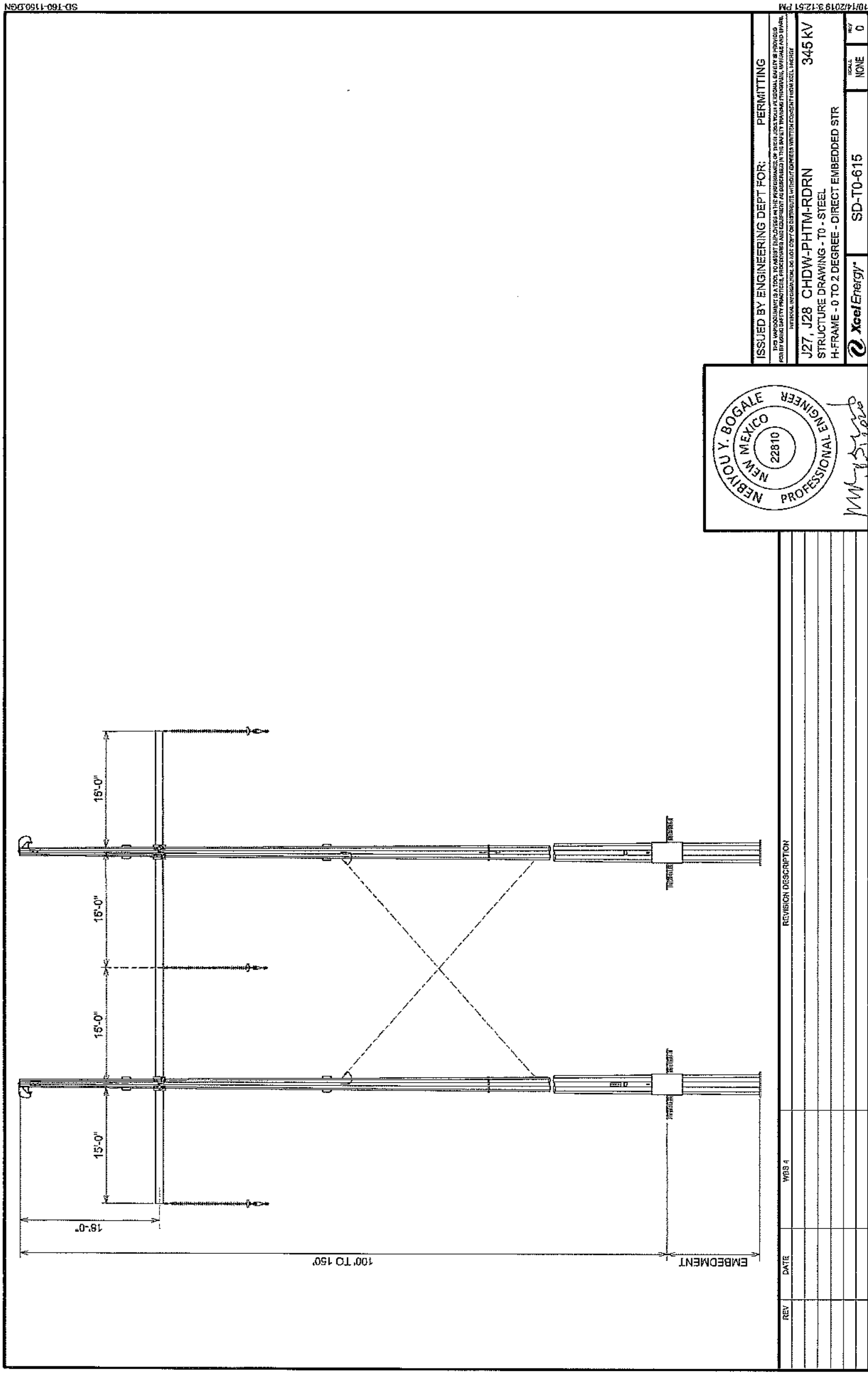
[5] Voltage adder value at NESC blow out weather case shown above also includes 3ft Xcel Energy tolerances.
[6] This voltage adder value at NESC extreme wind weather case is based on RUS Bulletin 1724E-200 7.2.3 for details
[7] Voltage adder value at NESC no wind, no ice, 60 deg. final weather case shown above also includes 3ft Xcel Energy tolerances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H-FRAME - 0 TO 2 DEGREE - DIRECT EMBEDDED STR
Xcel Energy
SD-T0-615
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REV 0
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REV
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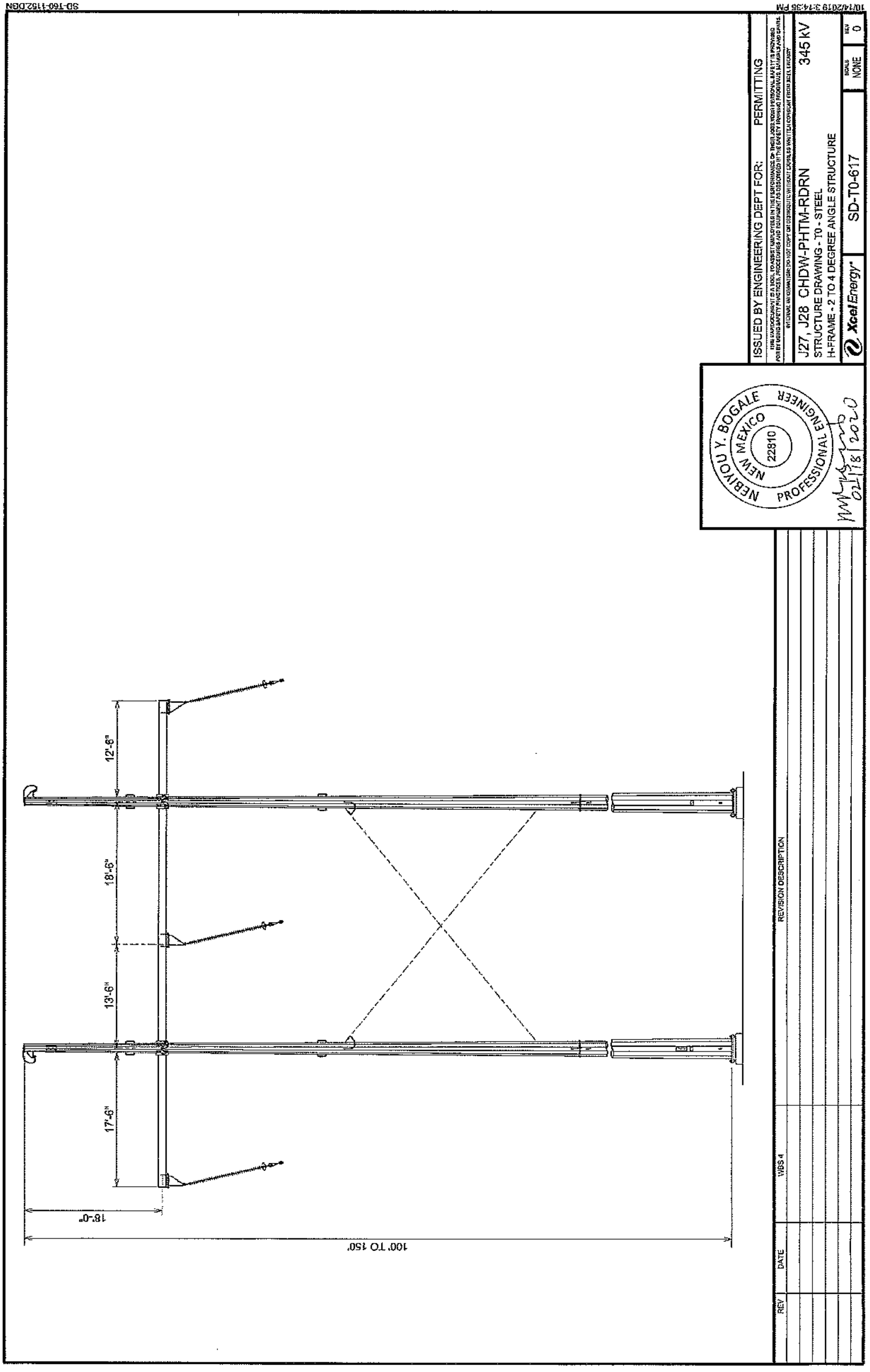
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345 kV
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H-FRAME - 2 TO 4 DEGREE ANGLE STRUCTURE
Xcel Energy
SD-T0-617
SCALE NONE
REV 0
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02/18/2020
REV
DATE
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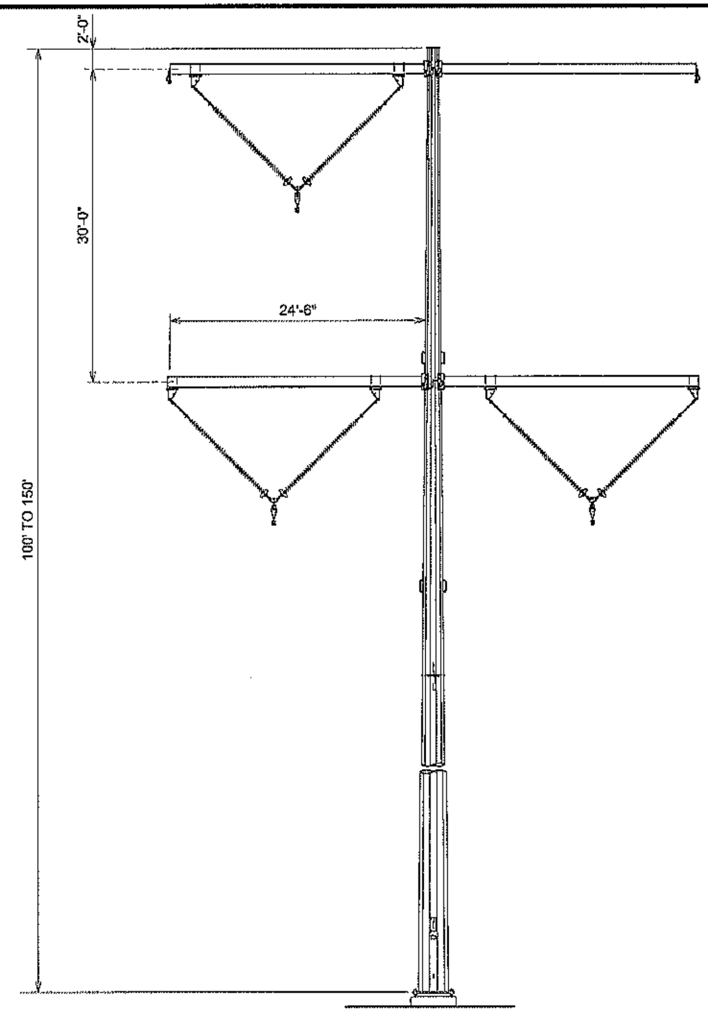
SD-T60-1151.DGN



REV	DATE	WBS 4	REVISION DESCRIPTION

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ISSUED BY ENGINEERING DEPT FOR: PERMITTING

J27, J28 CHDW-PHTM-RDRN 345 kV
STRUCTURE DRAWING - T0 - STEEL
SINGLE POLE - 0-2 DEG - DAVIT ARM W/ V-STRING INSULATORS

Xcel Energy | SD-T0-616 | SCALE NONE | REV 0

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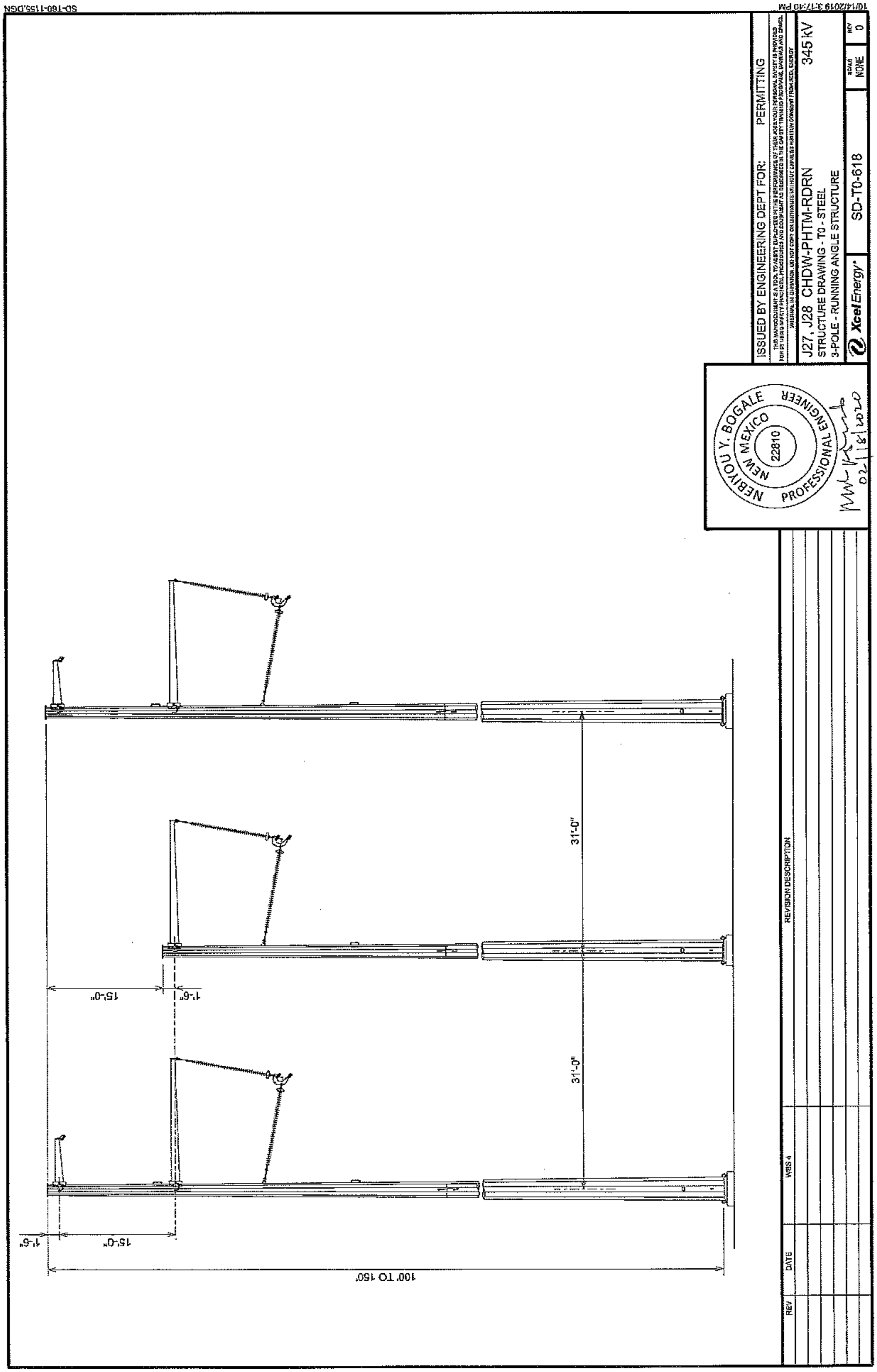
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Xcel Energy
SD-T0-618
SCALE NONE
REV 0
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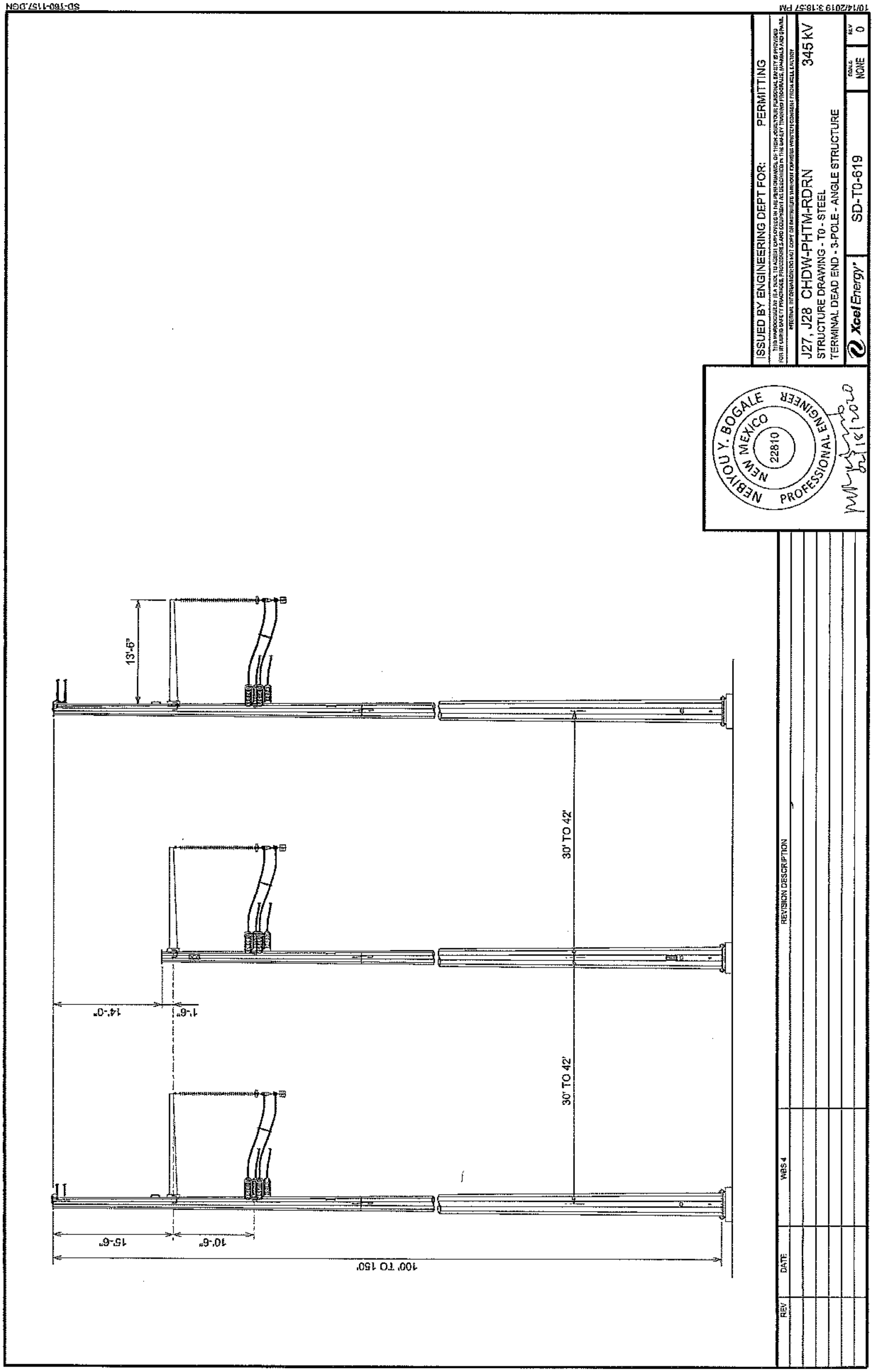
PROFESSIONAL ENGINEER
02/18/2020
REV
DATE
WBS 4
REVISION DESCRIPTION
31'-0"
31'-0"
15'-0"
1'-6"
15'-0"
1'-6"
100' TO 150'


10/14/2019 3:18:57 PM
ISSUED BY ENGINEERING DEPT FOR: PERMITTING
J27, J28 CHDW-PHTM-RDRN
345 kV
STRUCTURE DRAWING - T0 - STEEL
TERMINAL DEAD END - 3-POLE - ANGLE STRUCTURE
Xcel Energy
SD-T0-619
SCALE NONE
REV 0
NEBIYOU Y. BOGALE
NEW MEXICO
22810
PROFESSIONAL ENGINEER
REV
DATE
WBS 4
REVISION DESCRIPTION
13'-6"
30' TO 42'
30' TO 42'
14'-0"
1'-6"
15'-6"
10'-6"
100' TO 150'

Estimated Cost Table - Transmission Facilities for ROADRUNNER TO PHANTOM TO CHINA DRAW

	Transmission Facilities		**Total**
	China Draw to Phantom Total Circuit Miles 20.1	**Phantom To Road Runner Total Circuit Miles 22**	
Right-of-way (Easements and Fees)	$2,371,598.56		**$ 2,371,597.56**
Material and Supplies	$ 9,722,471.08	$ 10,042,864.84	**$ 19,765,335.92**
Labor and Transportation (Utility)	$ 74,816.00	$ 949,424.00	**$ 1,024,240.00**
Labor and Transportation (Contract)	$ 5,932,826.20	$ 7,185,873.82	**$ 13,118,700.02**
Stores	$ 18,000.00	$ 18,000.00	**$ 36,000.00**
Engineering and Administration (Utility)	$ 396,207.46	$ 396,207.46	**$ 792,414.92**
Engineering and Administration (Contract)	$ 2,347,173.33	$ 2,002,949.66	**$ 4,350,122.99**
Other*	$ 5,609,266.71	$ 5,219,413.22	**$ 10,828,679.93**
Cost to modify existing facilities**	$ -	$ -	**$ -**
Estimated Cost Subtotal	**$ 24,100,760.78**	**$ 25,814,733.00**	**$ 49,915,493.78**
Total AFUDC	**$ 437,863.14**	**$ 971,677.80**	**$ 1,409,540.94**
TOTAL COST	**$ 24,538,623.92**	**$ 26,786,410.80**	**$ 53,696,632.28**

***Indicates (Overheads+Escalation+Contingency)**

**** Cost include raising, rerouting and re-terminating existing circuits**